REMARKS

Claims 1-3, 6-18 and 22-26 remain for consideration. The specification has been amended to update the reference to the parent application and references to other cited applications that have now issued. Claims 6, 7 and 23 are amended for clarity. The support for the amendments of claims 6, 7 and 23 is found in the specification, for example, at page 32, lines 1-8. No new matter is introduced by the amendments.

The pending claims stand rejected. Applicants believe that claims 11-16 and 18 are free of the prior art. Applicants respectfully request reconsideration of the rejections based on the following comments.

Rejections Under 35 U.S.C. §112

The Examiner rejected claims 6, 7 and 23 under 35 U.S.C. §112, second paragraph as being indefinite. In particular, the Examiner indicated that the recitation of "effectively no particles" was unclear. While Applicants believe that the original language is sufficiently clear to a person of skill in the art, Applicants have amended claims 6, 7 and 23 to place a specific recitation into the claims, to advance prosecution. In view of the amendments, Applicants believe that the claims are clearly not indefinite. Applicants respectfully request the withdrawal of the rejection of claims 6, 7 and 23 under 35 U.S.C. §112, second paragraph as being indefinite.

Double Patenting

The Examiner rejected claims 1-3, 6-18 and 22-26 under the judicially created doctrine of obviousness-type double patenting over claims 1-18 of U.S. Patent 6,225,007. Applicants file a Terminal Disclaimer with this Amendment over U.S. Patent 6,225,007.

Applicants believe that the filing of the Terminal Disclaimer obviates the double patenting rejection. Applicants respectfully request the withdrawal of the obviousness-type double patenting rejection.

Rejection Under 35 U.S.C. §102(b)

The Examiner rejected claims 1-3, 6-10, 17 and 22-26 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent 5,549,880 to Koksbang (the Koksbang '880 patent). The Examiner cited the Koksbang patent for its disclosure of lithium-vanadium oxide active material having an electrolyte/binder support. As discussed below, Applicants believe that the Koksbang '880 patent does not disclose metal vanadium oxide particles with the claimed average particle sizes or particle size distributions. Applicants respectfully request reconsideration of the rejections over the Koksbang patent based on the following comments.

The Koksbang '880 patent describes the production of lithium vanadium oxide particles with "a surprisingly small particle size on the order of 0.1 to 5 microns, and typically less than 10 microns", see column 2, lines 58-60 and column 5, lines 4-6. This description seems to indicate that the powders had a range in particle size from about 0.1 microns to about 5 microns. This interpretation is consistent with the statement that the particle size is typically less than 10 microns. With most particles having a size in the range of 0.1 micron to 5 microns, the average particle size would be about 2.5 microns. This average particle size is more than a factor of two larger than indicated in Applicants' claim 1.

For further perspective on the interpretation of the Koksbang patent, Applicants refer to U.S. Patent 5,512,214 to Koksbang (the Koksbang '214 patent), a copy of which is enclosed. The Koksbang '214 patent describes the difficulty in using standard milling to obtain vanadium oxides with particle sizes less than 10 microns to 50 microns, see column 1, lines 39-42. The Koksbang '214 patent describes a similar decomposition reaction of ammonium metavanadate to produce

vanadium pentoxide in intimate contact with carbon black particles. The powders disclosed in the Koksbang '214 patent had "an average size less than 100 microns, desirably less than 50 microns and, preferably, less than 10 microns. It should be noted that median particle size refers to that size at which 50% by weight of the particles are, respectively, above and below in size." Note that Applicants use a particle average rather than a weight average to evaluate average particle size. The Koksbang '880 patent describes obtaining somewhat similar sized particles as those described in the Koksbang '214 patent as a result of a lithiation reaction that results in incorporation of lithium into the vanadium oxide lattice.

Based on a reasonable interpretation of the Koksbang patent, the Koksbang '880 patent describes the production of particles that are a factor of two greater in size than Applicants' claimed particles. Furthermore, the Koksbang '880 patent does not teach or suggest approaches for changing the particles sizes within their procedure. Thus, the Koksbang '880 patent does not anticipate Applicants' claimed invention.

Furthermore, the Examiner asserted that the claimed narrow particle size distributions were inherent based on the particle sizes. With all due respect, Applicants believe that there has been a misunderstanding. Particle size distribution is an independent property of a collection of particles distinct from the average particle size. For example, a collection of a baseball and a basketball may have an average diameter of about eight inches, but they would have a very different particle size distribution from a collection of two eight inch softballs with the same average diameter. For a powder, the particle size distribution generally is established by the method for producing the powder. In the present case, Applicants' laser pyrolysis approach produces a narrow particle distribution due to the well-localized reaction zone around the laser.

Since the Koksbang '880 patent does not disclose metal vanadium oxide particles with the claimed average particle sizes of less than about a micron or claimed narrow particle

size distributions, the Koksbang '880 patent does not anticipate the present invention. Applicants respectfully request withdrawal of the rejection of claims 1-3, 6-10, 17 and 22-26 under 35 U.S.C. §102(b) as being anticipated by the Koksbang '880 patent.

CONCLUSIONS

In view of the foregoing, it is submitted that this application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

The Examiner is invited to telephone the undersigned if the Examiner believes it would be useful to advance prosecution.

Respectfully submitted,

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ATTACHMENT
MARKED-UP AMENDMENT

IN THE SPECIFICATION

In a Preliminary Amendment filed with the application on January 9, 2001, a paragraph was added after the title referring to the parent application. This paragraph was amended as follows:

This application is a continuation of copending and commonly assigned U.S. Patent Application Serial No. 09/246,076 now U.S. Patent 6,225,007 [_____] to Horne et al., entitled "Metal Vanadium Oxide Particles," incorporated herein by reference.--

At page 8, lines 3-19, the paragraph was amended as follows:

Laser pyrolysis has been performed generally with gas phase reactants. The use of exclusively gas phase reactants is somewhat limiting with respect to the types of precursor compounds that can be used. Thus, techniques have been developed to introduce aerosols containing reactant precursors into laser pyrolysis chambers. The aerosol atomizers can be broadly classified as ultrasonic atomizers, which use an ultrasonic transducer to form the aerosol, or as mechanical atomizers, which use energy from one or more flowing fluids (liquids, gases, or supercritical fluids) themselves to form the aerosol. Improved aerosol delivery apparatuses for reactant systems are described further in copending and commonly assigned U.S. Patent Application Serial Number 09/188,670, now U.S. Patent 6,193,936, filed on November 9, 1998, entitled "Reactant Delivery Apparatuses," incorporated herein by reference.

At page 13, line 23 to page 14, line 8, the paragraph was amended as follows:

Aerosol generator 152 can operate based on a variety of principles. For example, the aerosol can be produced with an ultrasonic nozzle, with an electrostatic spray system, with a pressure-flow or simplex atomizer, with an effervescent atomizer or with a gas atomizer where liquid is forced under significant pressure through a small orifice and fractured into particles by a colliding gas stream. Suitable ultrasonic nozzles can include piezoelectric transducers. Ultrasonic nozzles with piezoelectric transducers and suitable broadband ultrasonic generators are available from Sono-Tek Corporation, Milton, NY, such as model 8700-120. Suitable aerosol generators are described further in copending and commonly assigned, U.S. Patent Application Serial No. 09/188,670, now U.S. Patent 6,193,936 to Gardner et al., entitled "REACTANT DELIVERY APPARATUSES," incorporated herein by reference. Additional aerosol generators can be attached to junction 156 through other ports 162 such that additional aerosols can be generated in interior 158 for delivery into the reaction chamber.

At page 20, line 18 to page 21, line 2, the paragraph was amended as follows: (Note this paragraph was previously amended in the Amendment dated January 9, 2001.)

An alternative design of a laser pyrolysis apparatus has been described in copending and commonly assigned U.S. Patent Application No. 08/808,850 now U.S. Patent 5,958,348, entitled "Efficient Production of Particles by Chemical Reaction," incorporated herein by reference. This alternative design is intended to facilitate production of commercial quantities of particles by laser pyrolysis. The reaction chamber is elongated along the laser beam in a dimension perpendicular to the reactant stream to provide for an increase in the throughput of reactants and products. The original design of the apparatus was based on the introduction of purely gaseous reactants. Alternative embodiments for the introduction of an aerosol into an elongated reaction

chamber is described in copending and commonly assigned U.S. Patent application serial No. 09/188,670 to Gardner et al., filed on November 9, 1998, now U.S. Patent 6,193,936, entitled "Reactant Delivery Apparatuses," incorporated herein by reference.

At page 22, lines 7-30, the paragraph was amended as follows:

The improved apparatus includes a collection system to remove the nanoparticles from the molecular stream. The collection system can be designed to collect a large quantity of particles without terminating production or, preferably, to run in continuous production by switching between different particle collectors within the collection system. The collection system can include curved components within the flow path similar to curved portion of the collection system shown in Fig. 1. A particular preferred collection system for particle production systems operating in a continuous collection mode is described in copending and commonly assigned U.S. Patent application serial number 09/107,729, now U.S. Patent 6,270,732 to Gardner et al., entitled "Particle Collection Apparatus And Associated Methods," incorporated herein by reference. A batch collection system for use with the improved reaction system is described in copending and commonly assigned U.S. Patent application serial number 09/188,770, filed on November 9, 1998, entitled "Metal Oxide Particles," incorporated herein by reference. The configuration of the reactant injection components and the collection system can be reversed such that the particles are collected at the top of the apparatus.

In the Claims

The following claim amendments have been made:

6. (Once Amended) The collection of particles of claim 1 wherein [effectively no particles] less than about 1 particle in 10^6 have a diameter greater than about four times the average diameter of the collection of particles.

7. (Once Amended) The collection of particles of claim 1 wherein [effectively no particles] less than about 1 particle in 10^6 have a diameter greater than about two times the average diameter of the collection of particles.

23. (Once Amended) The battery of claim 17 wherein [effectively no active particles] less than about 1 active particle in 10^6 have a diameter greater than about four times the average diameter of the collection of active particles.